

Message

**From:** Brown, Cheryl A. [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=DD6F8A562924439AAF97CA98DDAF1E10-BROWN, CHERYL]  
**Sent:** 3/8/2016 12:13:28 AM  
**To:** Labiosa, Rochelle [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ded3654216c9461d95cd5a3ceec507ef-Labiosa, Rochelle]; Fullagar, Jill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7ba061353c314b40a14a8be1ee382ae3-Gable, Jill]; Cox, Michael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=cddd6a5bb3c2477183799ef56cdb464f-Cox, Michael]; Cope, Ben [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=497efadd936e4d378225116b8f50fd3f-Cope, Ben]; Cora, Lori [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c8850941bf1540c796559dce75c2f5ee-Cora, Lori]; Jacobson, Martin [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8fafee20580b4afaa071e71ddcc088eb-Jacobson, M]  
**Subject:** RE: Upwelling index info RE: [Deliberative Process / Ex. 5] Issue Paper  
**Attachments:** Bednarsek Only Data points off of Oregon.pdf

I produced a graphic which may be of use.

I colored the data points in Figure 3 for the stations that are off of the Oregon Coast and mapped the locations of these stations.

(Station 15 is the closest to state waters and is about 6.5 miles offshore)

## Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Has anyone contacted the author to find out if they collected any data within state waters? I find it surprising that they didn't sample more nearshore locations. I wonder if there are additional pteropod data available.  
Cheryl

**From:** Labiosa, Rochelle  
**Sent:** Monday, March 07, 2016 3:37 PM  
**To:** Fullagar, Jill <Fullagar.Jill@epa.gov>; Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>  
**Subject:** RE: Upwelling index info RE: [Deliberative Process / Ex. 5] Issue Paper

This is a good corroborating paper (although not 2011) on wind-driving upwelling in the inner shelf in OR. [Deliberative Process / Ex. 5]

## Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

But I will write it up more clearly and also look for any updated analysis.

<http://onlinelibrary.wiley.com/doi/10.1029/2004JC002611/full>

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**From:** Fullagar, Jill

**Sent:** Monday, March 07, 2016 3:10 PM

**To:** Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>

**Subject:** RE: Upwelling index info RE: Deliberative Process / Ex. 5 Issue Paper

**Deliberative Process / Ex. 5**

**Deliberative Process / Ex. 5**

Thanks.

jill

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**From:** Labiosa, Rochelle

**Sent:** Monday, March 07, 2016 3:00 PM

**To:** Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Fullagar, Jill <Fullagar.Jill@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>

**Subject:** RE: Upwelling index info RE: Deliberative Process / Ex. 5 Issue Paper

Thanks Cheryl –the result (ie 2011 in the middle of the pack) is very comparable to the NOAA index data from the offshore location- but they are slightly different data. The attached is windstress strength, which is a good proxy, but wind angle also matters (and the upwelling index is supposed to reflect both);

**Deliberative Process / Ex. 5**

**Deliberative Process / Ex. 5**

**Deliberative Process / Ex. 5**

# Deliberative Process / Ex. 5

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**From:** Brown, Cheryl A.

**Sent:** Monday, March 07, 2016 2:36 PM

**To:** Fullagar, Jill <Fullagar.Jill@epa.gov>; Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>

**Subject:** RE: Upwelling index info RE: Deliberative Process / Ex. 5 Issue Paper

**Importance:** High

I forgot about this Oregon upwelling index. It is used very often in Oregon shelf papers.  
Using it you can compare upwelling strength for different years:

<http://damp.coas.oregonstate.edu/windstress/>

This figure shows that 2011 is not anomalous. Might be able to just use this.

<http://damp.coas.oregonstate.edu/windstress/allyears.html>

I have the Harris paper (referenced in Rochelle's email) if anyone wants that one. I didn't include it in the citations because they only measure pCO<sub>2</sub>, so aragonite saturation state isn't calculated.

Cheers,  
Cheryl

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**From:** Fullagar, Jill

**Sent:** Monday, March 07, 2016 2:22 PM

**To:** Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>

**Subject:** RE: Upwelling index info RE: Deliberative Process / Ex. 5 Issue Paper

Thanks Rochelle.  
Marty—is this something you could help us with? Thanks.

jill

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**From:** Labiosa, Rochelle

**Sent:** Thursday, March 03, 2016 10:23 AM

**To:** Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Fullagar, Jill <Fullagar.Jill@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>

**Subject:** Upwelling index info RE: Deliberative Process / Ex. 5 Issue Paper

Hi All,

# Deliberative Process / Ex. 5

Below is a link to PFEG data location – I downloaded daily from 45N 125W, which is a location off of Lincoln City, but there are other locations listed. I can pull in another site if needed, but this was the most central location for OR.

[http://www.pfeg.noaa.gov/products/PFEL/modeled/indices/upwelling/NA/data\\_download.html](http://www.pfeg.noaa.gov/products/PFEL/modeled/indices/upwelling/NA/data_download.html)

## Deliberative Process / Ex. 5

*The results for the 2011 cruise (figure 1a,c), which are representative of summertime conditions for the last few years, show evidence for corrosive water shoaling along the bottom to depths of about 20–50 m in the coastal waters off Washington, Oregon and northern California, and to depths of 60–120 m off southern California. The Washington–Oregon results are consistent with time-series measurements off Newport, Oregon, which provide evidence for increased fluctuations in  $\Omega_{ar}$  (range: 0.8–3.8) on time-scales of weeks and very low saturation state waters during the upwelling season from June through to October [14,16]. From the moored saturation state and temperature observations from 2007 through to 2011, it is evident that the upwelling events primarily occur in the summer and early autumn months and last for approximately one to five weeks [14,16].*

14=Harris KE, DeGrandpre MD, Hales B. 2013 Aragonite saturation state dynamics in a coastal upwelling zone. *Geophys. Res. Lett.* 40, 2720–2725. (doi:10.1002/grl.50460)CrossRefGeoRefWeb of Science

16= Evans W, Hales B, Strutton PG. 2011 Seasonal cycle of surface ocean pCO<sub>2</sub> on the Oregon shelf. *J. Geophys. Res.* 116, C05012. (doi:10.1029/2010JC006625)CrossRef

Next thing up – I will be looking further at the SST data – I looked at the 4km and it is not high enough resolution, so now I am looking at the 1km data. Will keep you posted.

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**From:** Brown, Cheryl A.

**Sent:** Tuesday, March 01, 2016 1:37 PM

**To:** Cox, Michael <[Cox.Michael@epa.gov](mailto:Cox.Michael@epa.gov)>; Fullagar, Jill <[Fullagar.Jill@epa.gov](mailto:Fullagar.Jill@epa.gov)>; Labiosa, Rochelle <[labiosa.rochelle@epa.gov](mailto:labiosa.rochelle@epa.gov)>; Cope, Ben <[Cope.Ben@epa.gov](mailto:Cope.Ben@epa.gov)>; Cora, Lori <[Cora.Lori@epa.gov](mailto:Cora.Lori@epa.gov)>

**Subject:** RE: Deliberative Process / Ex. 5 Issue Paper

Looks like a great outline to me.

Here are some minor revisions.

Cheryl

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**From:** Cox, Michael

**Sent:** Tuesday, March 01, 2016 11:29 AM

**To:** Fullagar, Jill <[Fullagar.Jill@epa.gov](mailto:Fullagar.Jill@epa.gov)>; Labiosa, Rochelle <[labiosa.rochelle@epa.gov](mailto:labiosa.rochelle@epa.gov)>; Cope, Ben <[Cope.Ben@epa.gov](mailto:Cope.Ben@epa.gov)>; Brown, Cheryl A. <[Brown.Cheryl@epa.gov](mailto:Brown.Cheryl@epa.gov)>; Cora, Lori <[Cora.Lori@epa.gov](mailto:Cora.Lori@epa.gov)>

**Cc:** Cox, Michael <[Cox.Michael@epa.gov](mailto:Cox.Michael@epa.gov)>

**Subject:** Deliberative Process / Ex. 5 Issue Paper

I took what I heard yesterday, incorporated Cheryl's input, and incorporated Ben's initial comments into an initial draft of an issue paper for the Deliberative Process / Ex. 5

Prior to filling in the blanks, I wanted to make sure people were okay with the outline.

I was thinking this would be the briefing paper for OWW management.

The second page is just a to-do list for us.

Please get comments back to me and then we can discuss how to move forward.

Thanks.

Michael Cox

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